

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An apparatus for removing metal from a wafer edge, comprising:

a bath tank containing a chemical bath for metal etching;

a rotatable wafer chuck holding a wafer vertical to the chemical bath from a center portion thereof, wherein at least an edge portion of the wafer is covered with a metal layer; and

a sliding element disposed on one end of the rotatable wafer chuck such that the rotatable wafer chuck is removable in a vertical direction to the chemical bath and only the edge portion of the wafer is immersed in the chemical bath.
2. (Original) The apparatus as claimed in claim 1, further comprising a front suppression line disposed substantially in front of the wafer and near the surface of the chemical bath to provide a first flow for suppressing the chemical bath from splashing the wafer.
3. (Original) The apparatus as claimed in claim 2, wherein the first flow comprises an inert gas with a flow rate between 5~100 sccm.
4. (Original) The apparatus as claimed in claim 1, further comprising a front rinse line disposed in front of the wafer to provide a rinse fluid for cleaning the front wafer surface.
5. (Original) The apparatus as claimed in claim 4, wherein the flow rate of the rinse fluid is between 500~30000 ml/min.

6. (Original) The apparatus as claimed in claim 2, further comprising a front rinse line disposed in front of the wafer and in a position closer to the wafer center than the front suppression line to provide rinse fluid for cleaning the front wafer surface.

7. (Original) The apparatus as claimed in claim 6, wherein the flow rate of the rinse fluid is between 500~30000 ml/min.

8. (Original) The apparatus as claimed in claim 1, further comprising a rear suppression line disposed substantially behind the wafer and near the surface of the chemical bath to provide a second flow for suppressing the chemical bath from splashing the wafer.

9. (Original) The apparatus as claimed in claim 8, wherein the second flow comprises an inert gas with a flow rate between 5~100 sccm.

10. (Original) The apparatus as claimed in claim 1, further comprising a rear rinse line disposed behind the wafer to provide a rinse fluid for cleaning the rear wafer surface.

11. (Original) The apparatus as claimed in claim 10, wherein the flow rate of the rinse fluid is between 500~30000 ml/min.

12. (Original) The apparatus as claimed in claim 8, further comprising a rear rinse line disposed behind the wafer and in a position closer to the wafer center than the rear suppressive nozzle to provide rinse fluid for cleaning the rear wafer surface.

13. (Original) The apparatus as claimed in claim 12, wherein the flow rate of the rinse fluid is between 500~30000 ml/min.

14. (Currently Amended) A method for removing metal from a wafer edge, comprising the steps of:

providing a wafer with a metal layer at least covering an edge portion thereof held by a rotatable wafer chuck from a center portion thereof;

vertically immersing only the edge portion of the wafer into a chemical bath for etching the metal layer; and

rotating the rotatable wafer chuck ~~the wafer~~ to remove the metal layer at only the edge portion from the surface and the edge ~~thereof~~ the wafer.

15. (Original) The method as claimed in claim 14, wherein the predetermined portion is about 1~5 mm from the wafer edge.

16. (Original) The method as claimed in claim 14, further comprising the step of providing a front suppression flow to the surface of the chemical bath near the front wafer

surface during the wafer edge metal removal to suppress the chemical bath from splashing a portion of the wafer.

17. (Original) The method as claimed in claim 16, wherein the front suppression flow is provided by a front suppression line disposed in front of the front wafer surface.

18. (Original) The method as claimed in claim 16, wherein the front suppression flow comprises an inert gas.

19. (Original) The method as claimed in claim 14, further comprising the step of providing a front rinse flow for cleaning the front wafer surface subsequent to the wafer edge metal removal.

20. (Original) The method as claimed in claim 19, wherein the front rinse flow is provided by a front rinse line disposed in front of the wafer.

21. (Original) The method as claimed in claim 16, further comprising the step of providing a rinse fluid to the front wafer surface for cleaning the rear wafer surface subsequent to the wafer edge metal removal.

22. (Original) The method as claimed in claim 16, wherein the front rinse flow is provided by a front rinse line disposed in front of the wafer and in a position closer to the wafer center than the front suppression line.

23. (Original) The method as claimed in claim 14, wherein the wafer is rotated at a speed between 5 to 300 rpm by a rotatable wafer chuck.

24. (Original) The method as claimed in claim 14, wherein the metal layer is a copper layer.

25. (Original) The method as claimed in claim 24, wherein the chemical bath comprises a solution of sulfuric acid, H_2O_2 and DI water.

26. (Previously Presented) The method as claimed in claim 14, which is performed using the apparatus of claim 1, comprising the steps of:

disposing the wafer on the rotatable wafer chuck;
vertically immersing the wafer edge into the chemical bath by moving the sliding element; and
rotating the rotatable wafer chuck to remove the metal layer at the wafer edge.

27. (Previously Presented) The apparatus as claimed in claim 1, wherein the rotatable wafer chuck is for holding a backside of the wafer.

28. (Previously Presented) The method as claimed in claim 26, wherein the step of disposing the wafer on the rotatable wafer chuck includes disposing a backside of the wafer onto the rotatable wafer chuck.

29. (Previously Presented) The method as claimed in claim 26, wherein the step of disposing the wafer on the rotatable wafer chuck includes holding the wafer non-movable relative to the rotatable wafer chuck during rotation of the rotatable wafer chuck.

30. (Previously Presented) The method as claimed in claim 26, wherein the step of rotating the wafer includes rotating a backside of the wafer.

31. (Previously Presented) The method as claimed in claim 14, wherein the step of providing the wafer with the metal layer at least covering the edge thereof includes providing the wafer with the metal layer at least covering a lateral side edge of the wafer.